

REMARKS

The Examiner rejected claims 12 and 13 under 35 U.S.C. §102 as being anticipated by WO 96/25367.

Applicants have amended base claim 12 without prejudice or disclaimer, and added claims 14-20. Support for the pending claims may be found, for example, on page 7, line 6 to page 8, line 29 of the Instant Application:

The weighting material is suitably grains of sand and is preferably incorporated substantially wholly within the granules. . . .

The surface of the weighted granules is provided with concavities to serve as habitats for microorganisms effective in waste water treatment. The concavities preferably cover substantially the whole surface of the granules . . .

The concavities not only increase the specific surface area, and thus the available habitat area for the microorganisms, but they also provide a sheltered environment which particularly favours the growth of a desirably dense and stable population of microorganisms. In prior art arrangements with microorganisms exposed on the external surfaces of media or structures, they are liable to become detached by abrasion or tumbling during circulation of waste water . . .

The loose particulate material is suitably manufactured by incorporating the weighting material within the plastics material granules and then creating the surface concavities. The weighted granules are contacted with grains of a soluble substance, at an elevated temperature, to coat the weighted granules with the soluble substance grains, and subsequently dissolving the soluble substance grains from the coating to provide the surface of the granules with the concavities.

(emphasis added).

Applicants respectfully submit that the pending claims are patentable over the art of record, and are otherwise in condition for allowance.

WO 96/25367 discloses "Granules of plastics material have grains of an inert mineral such as sand coated thereon to provide a habitat for microorganisms effective in waste water treatment, . . . the grains having a predetermined particle size range and being disposed at a predetermined packing density range on the granules. . . . The particles are

manufactured by contacting the granules of plastics material with a mixture of grains of the inert mineral and grains of a soluble substance such as salt, at an elevated temperature, to coat the granules with the mixture, and subsequently dissolving the soluble substance grains from the coating to provide the granules coated with the grains of inert mineral in the predetermined packing density range." (WO 96/25367 Abstract).

In contrast each of claims 12 and 13, as amended, recites a method of manufacture of loose particulate material for use in waste water treatment, the method comprising a certain combination including, inter alia, a step of "contacting granules of plastic materials with grains entirely of a soluble substance." (Base Claim 12). The art of record, including WO 96/25367, fails to disclose this recited combination; WO 96/25367 merely discloses using a mixture of soluble substance and inert mineral grains.

Furthermore, no reasonable combination of the art of record, including WO 96/25367, even suggests this combination. More specifically, WO 96/25367 discloses that its object is to provide particulate material having a predetermined specific gravity by forming a coating of inert mineral grains on the surfaces of the plastics granules. In WO 96/25367 the soluble substance grains are present in order to control the packing density of the inert material grains on the plastics granule surfaces. This controls the specific gravity of the material produced comprising plastic material granules with inert mineral grains coated on their outer surfaces. See for example page 8 lines 4 to 10 of WO 96/25367.

Although, as noted by the Examiner, WO 96/25367 teaches that a mixture of grains of soluble substance and inert mineral will provide concavities in the surfaces of the granules where the grains of the soluble substance have been embedded in the surface of

the plastics granules and subsequently dissolved away, this effect is described only in the context of the use of a mixture of soluble substance grains and inert mineral grains.

More specifically, WO 96/25367 discloses

the contact conditions between the granules and the mixture of grains, and the elevated contact temperature, can be adjusted such that the grains coat the granules by burying themselves significantly into the partially melted outer surface of the granules. Thus the grains may have about 50% of their volume buried and the other 50% exposed proud of the surface, so as to retain them securely in position on the granules during their subsequent use in waste water treatment.

... by using such significantly buried grains, the subsequent step of dissolving away the soluble substance grains leaves concavities in the surface of the granules having quite comparable overall surface areas to that of the adjacent convexities of the retained insoluble inert material grains. This gives the important technical advantage that the specific surface area of the loose particulate material particles is essentially independent of the initial proportions of numbers of grains of inert material and numbers of grains of soluble substance.

Accordingly the initial proportions may be selected over a wide range, for example from 1:1 up to 8:1 or even higher of salt:sand, without compromising the high specific surface area, for example in excess of about 600m² per cubic metre as mentioned above.

It will be appreciated that a large number of smaller grains will provide a higher specific surface area, but the advantage of using significantly buried grains is that the grain size can be selected for a particular specific surface area independent of selection of the ratio of salt:sand. The invention has thus achieved loose particulate material optimally adapted for efficient and effective waste water treatment.

(WO96/25367 page 12, line 25 - page 13, line 21).

Accordingly, the skilled person reading WO 96/25367 would not be lead to forming the particulate material by coating granules with grains entirely of a soluble substance because this change would go directly against the explicit teaching of WO96/25367 that the use of a mixture including inert mineral grains is essential so that the inert mineral grains embedded in the surfaces of the plastics granules can control the specific gravity of the particulate material.

In the process of WO 96/25367 the objective is to coat the surfaces of the plastic granules with a controlled amount of inert mineral grains, the addition of soluble substance grains together with the inert mineral grains is intended only to control the packing density or amount of inert material grains which become attached to the surfaces of the plastics material grains to form the resulting particulate material and so to control the specific gravity of the particulate material.

Accordingly, amended claim 12 is nonobvious in view of the art of record, as the elimination of the inert material grains and the use of soluble substance grains only would go directly against the teaching of WO 96/25367 that the attachment of inert mineral grains to the plastics granules is essential, and is indeed the entire purpose of the process described in WO 96/25367.

It cannot be reasonably regarded as obvious to modify the teaching of a reference in a way that will prevent the object of the reference being achieved.

As recited in amended claim 12, the use of grains entirely of a soluble substance is that the outer surfaces of the plastics granules forming the loose particulate material can be coated with concavities formed by embedding soluble substance grains into the plastics granules and subsequently dissolving the soluble substance grains. In the past it has been the understanding of workers in the field of waste water treatment media that in order to increase the effectiveness of particulate material used in biological filtering the ratio of surface area to volume of the particulate material should be increased as far as possible. Accordingly, WO 96/25367 teaches that it is generally desirable to achieve a high specific surface area per volume for the particulate material, for example at page 5 line 33 to page 6 line 2. However, the inventor of the present application has realized that the analysis

based upon the surface area to volume ratio of the loose particulate material is not the only factor to be considered. As is explained at page 3 lines 7 to 8 of the present application the surface concavities formed in the surfaces of the loose particulate material provide a better habitat for micro-organisms than exposed external surfaces. As a result, comparing loose particulate material having the same surface area per unit volume, the particulate material formed by the method of amended claim 12 using grains entirely of a soluble substance will provide a better environment for micro-organism growth and accordingly perform better as part of a waste water treatment system than loose particulate material formed using the process of WO 96/25367 in which a mixture of soluble substance grains and inert mineral grains are used.

Accordingly, amended claim 12 is patentable because it provides advantages over the teaching of WO 96/25367 and these advantages and the way in which they can be obtained could not be understood by the skilled person from the teaching of WO96/25367.

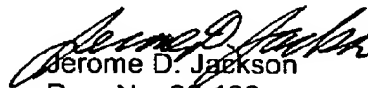
Claims 14-20 are patentable as each recites a combination including, inter alia, producing weighted granules by incorporating a second material into a first material; subsequently contacting the weighted granules at an elevated temperature with a third material, the third material including grains of a soluble substance, to coat the weighted granules with the third material; and subsequently dissolving the soluble substance grains from the coating to provide the weighted granules with concavities as a habitat for microorganisms effective in waste water treatment. (Base Claim 14). No reasonable combination of the art of record, including WO 96/25367, suggests this precise interrelation of incorporating a second material and subsequently contacting and dissolving.

In view of the foregoing amendment and remarks, Applicants respectfully submit that claims 12 and 13, as amended, and claims 14-20 are patentable, and that the Application is otherwise in condition for allowance. Applicants respectfully request the reconsideration of the Application and the timely allowance of these claims.

If there are any other fees required for entry of this amendment, or for any other reason, please charge such fees to the undersigned Attorney's Deposit Account No. 10-0077.

If the Examiner has any questions about this amendment, applicants' representative would appreciate discussing this amendment with the Examiner. Applicants' representative, Jerome Jackson, can be reached at 703-684-4840.

Respectfully submitted,


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DATED: 20 Nov 03